



National Transportation Safety Board

The Role of Sleep Loss in Transportation Accidents: NTSB Investigations and Recommendations

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- 1) determining the probable cause of transportation accidents**
- 2) making recommendations to prevent their recurrence**



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All Modes



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PG&E/San Bruno Gas Pipeline Explosion



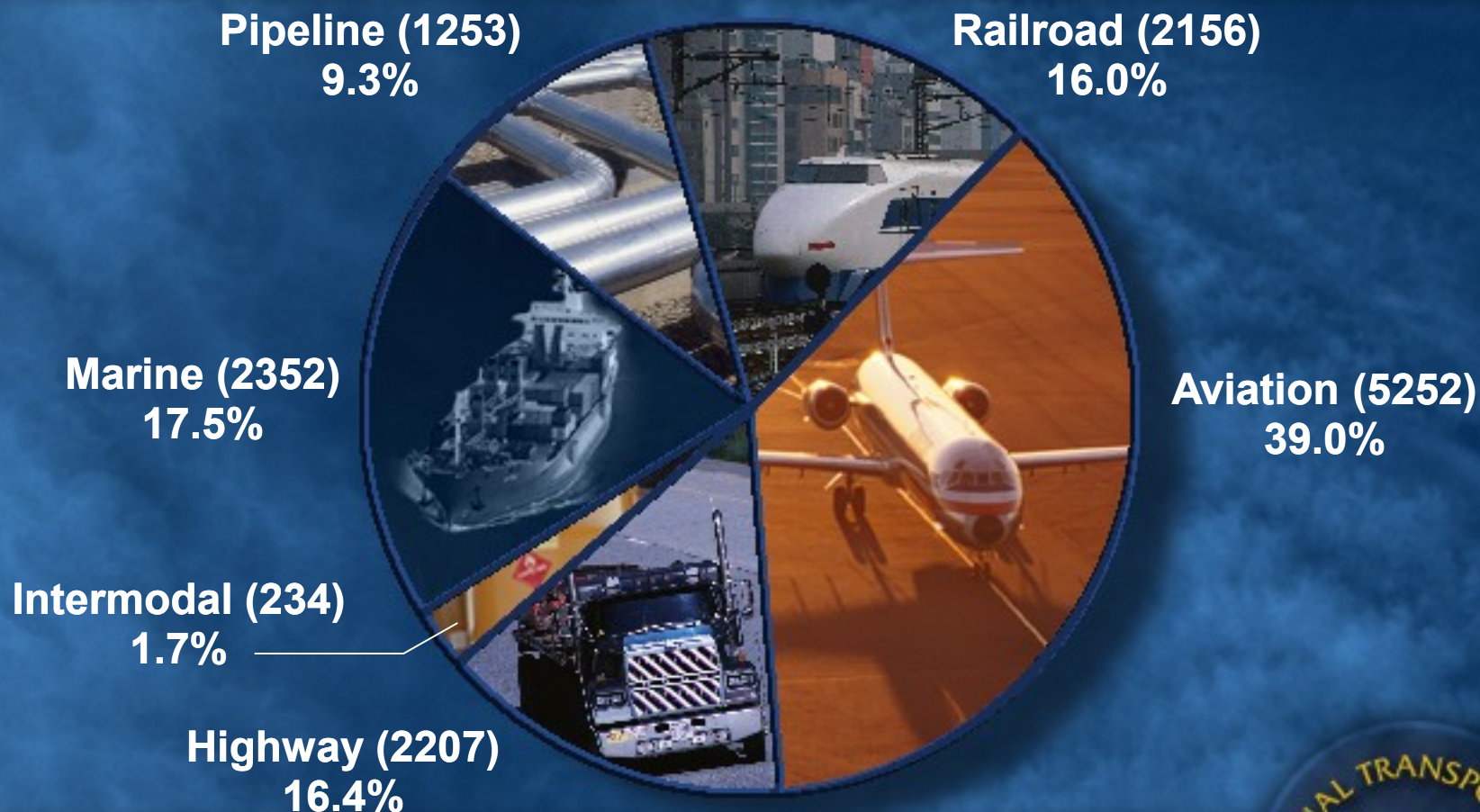
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Independent Federal Agency: Created in 1967

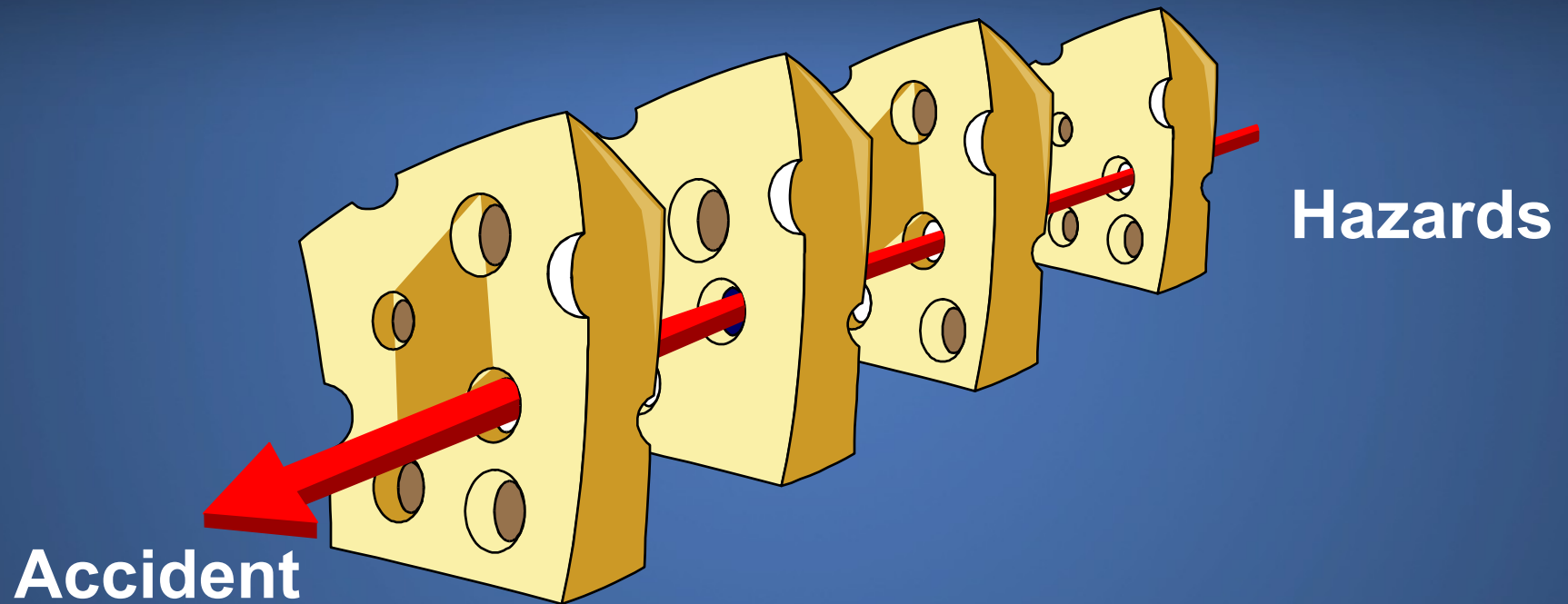
- ~ 132,000 accident investigations
- 13,500+ safety recommendations
- ~ 2,500 organizations/recipients
- 82% acceptance rate



13,454 Safety Recommendations issued since 1967



“Swiss Cheese” Model (Reason)



Successive layers of defenses, barriers, and safeguards



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NTSB Go Team: 24/7/365

- Individual investigator
- Regional/limited team
- Major launch/Board Member



Key On-scene Events



Organizational Meeting

- Designate parties and party coordinators
- Establish and organize groups

Progress Meetings

- Summarize findings
- Info for briefings

Family Briefings

Press Briefings



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NTSB Investigative Process



On-scene Investigation

Organizational Meeting
Groups and Parties

Progress meetings
Media Briefings
Press Releases

A screenshot of the NTSB Preliminary Report form. The form includes fields for Aircraft Identification, Date, Time, Location, and a description of the accident. The aircraft is identified as a Bombardier CRJ-440, and the accident is described as a controlled flight into terrain (CFIT) on February 12, 2009.

Preliminary Report

Factual information



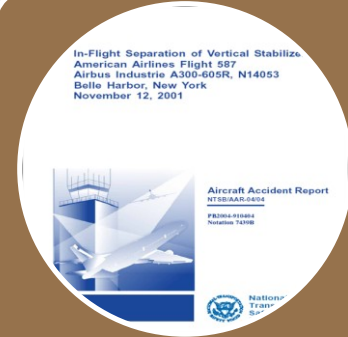
Public Hearing

Fact finding
Depositions
Witnesses
Docket



Board Meeting

Docket
Findings
Conclusions
Probable Cause
Safety Recommendations



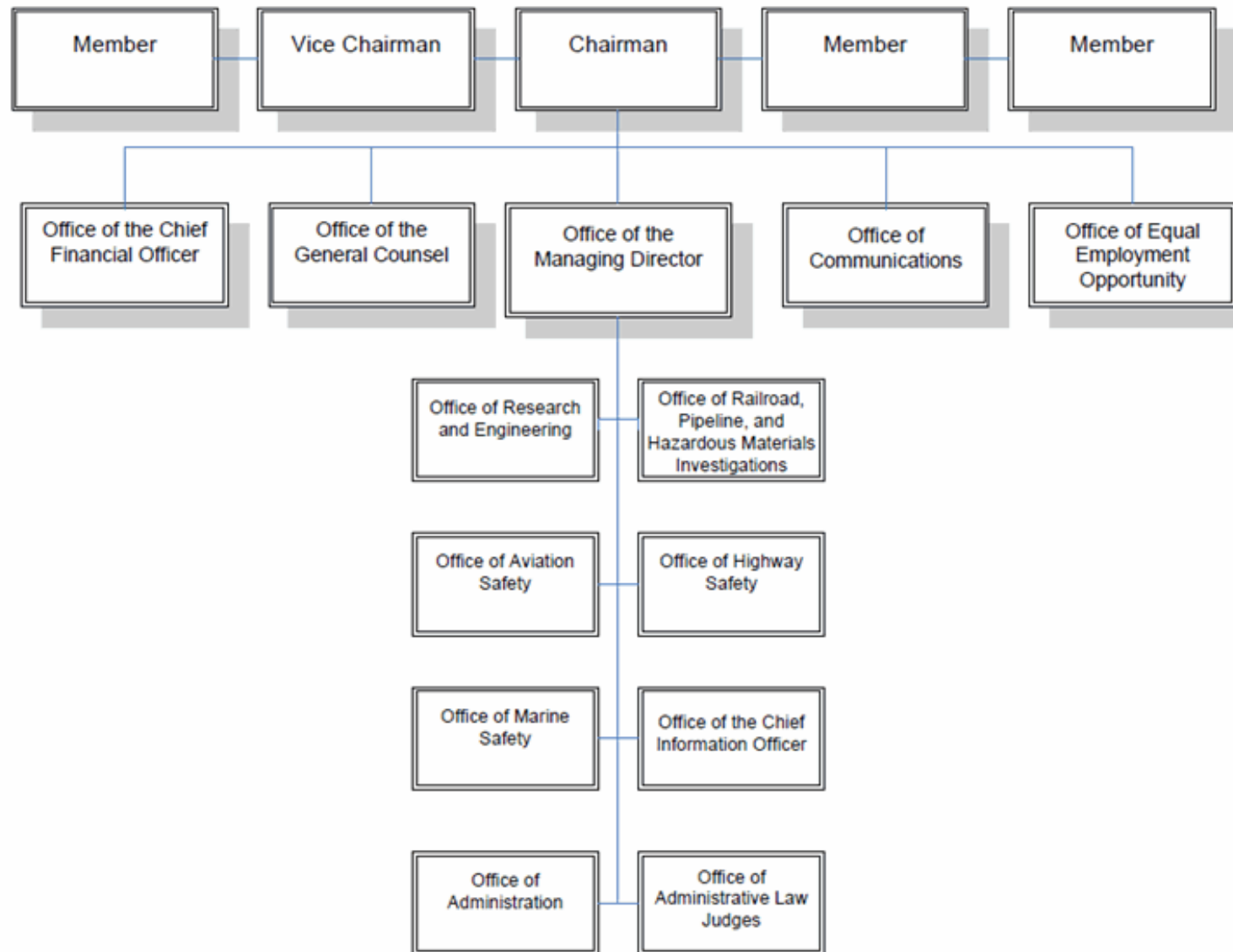
Final Report

Government in the Sunshine Act



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NATIONAL TRANSPORTATION SAFETY BOARD



NTSB: The Board

- Five Members:
 - President nominates
 - Senate confirms



Mark Rosekind
Member



Chris Hart
Vice Chairman



Debbie Hersman
Chairman



Robert Sumwalt
Member



Earl Weener
Member



NTSB Characterized as:

‘moral compass and industry conscience’

NTSB Chairman Deborah A.P. Hersman



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Sleep loss is a safety risk
in transportation.



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Miami, Oklahoma (June 26, 2009)

- Initial minor accident (~1:13 pm)
 - blocked eastbound I-44
- 2008 Volvo truck-tractor (~1:19 pm)
 - refrigerated semitrailer
 - traveling eastbound on I-44
 - 69 mph with cruise control engaged
 - without slowing or braking collided into queue of slowing & stopped vehicles



Fatigue Factors

- Off work for 3 weeks: day active/night sleep schedule
- 3am to 3pm shift work/drive schedule (since 1997)
- Early bedtime (2 hr phase advance in sleep time)
- Obtained min 3 hrs/max 5 hrs sleep prior to accident
- Subsequently diagnosed with mild sleep apnea



Miami, OK (June 26, 2009)

10 fatalities
3 serious injuries
2 minor injuries
5 no injuries



Probable Cause (fatigue)

“ . . . driver’s fatigue, caused by the combined effects of acute sleep loss, circadian disruption associated with his shift work schedule, and mild sleep apnea, which resulted in the driver’s failure to react to slowing and stopped traffic ahead by applying the brakes or performing any evasive maneuver to avoid colliding with the traffic queue. . . . ”



Collision of Tankship *Eagle Otome* with Cargo Vessel *Gull Arrow*
and Subsequent Collision with the *Dixie Vengeance* Tow
Sabine-Neches Canal, Port Arthur, Texas
January 23, 2010



Accident Report

NTSB/MAR-11/04
PB2011-916404



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Collision: Eagle Otome



Photo U.S. Coast Guard



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Collision: Eagle Otome

- Contributing to the accident was the first pilot's fatigue, caused by his untreated obstructive sleep apnea and his work schedule, which did not permit adequate sleep;





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Track Path Animation

Collision Between Two BNSF Railway Freight Trains

Red Oak, Iowa

April 17, 2011

DCA11FR002



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Probable Cause (fatigue)

“ . . . failure of the crew of the striking train to comply with the signal indication requiring them to operate in accordance with restricted speed requirements and stop short of the standing train because they had fallen asleep due to fatigue resulting from their irregular work schedules and their medical conditions.”



Owatonna, MN (July 31, 2008)



8 fatalities



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Owatonna Crew Fatigue Factors

- acute sleep loss (Capt/FO)
- cumulative sleep debt (FO)
- early start time (Capt/FO)
- excessive sleep need (Capt)
- insomnia (FO)
- self-medicate/prescription sleep med (FO)



Probable Cause/Contributing Factors

“Contributing to the accident were . . .
(2) fatigue, which likely impaired both
pilots’ performance; . . .”



Lubbock, TX (January 27, 2009)



2 injuries



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Probable Cause/Contributing Factors

“Contributing to the accident were . . .

4) fatigue due to the time of day in which the accident occurred and a cumulative sleep debt, which likely impaired the captain’s performance.”

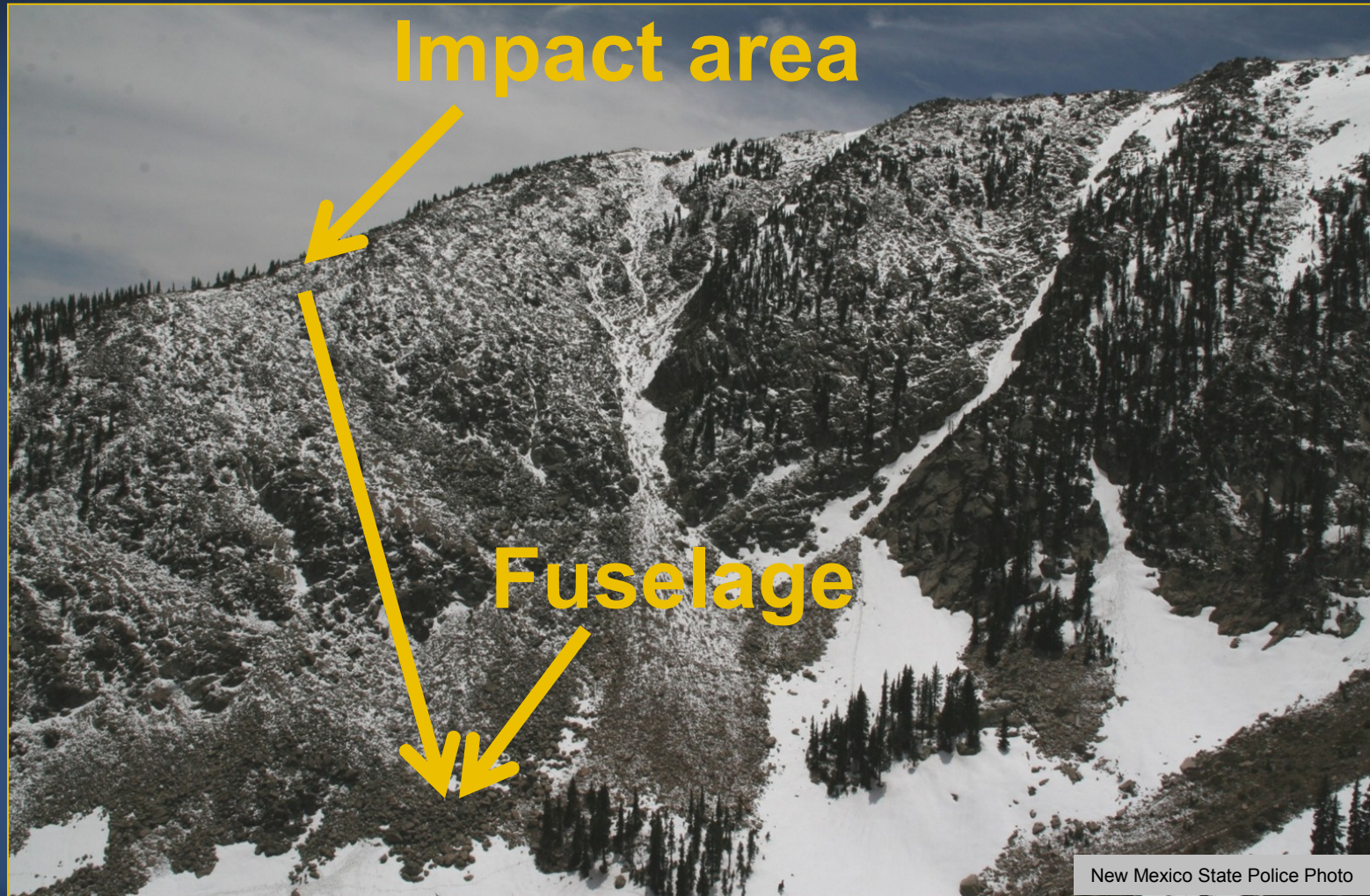


New Mexico State Police Helicopter Sante Fe, New Mexico (June 9, 2009)



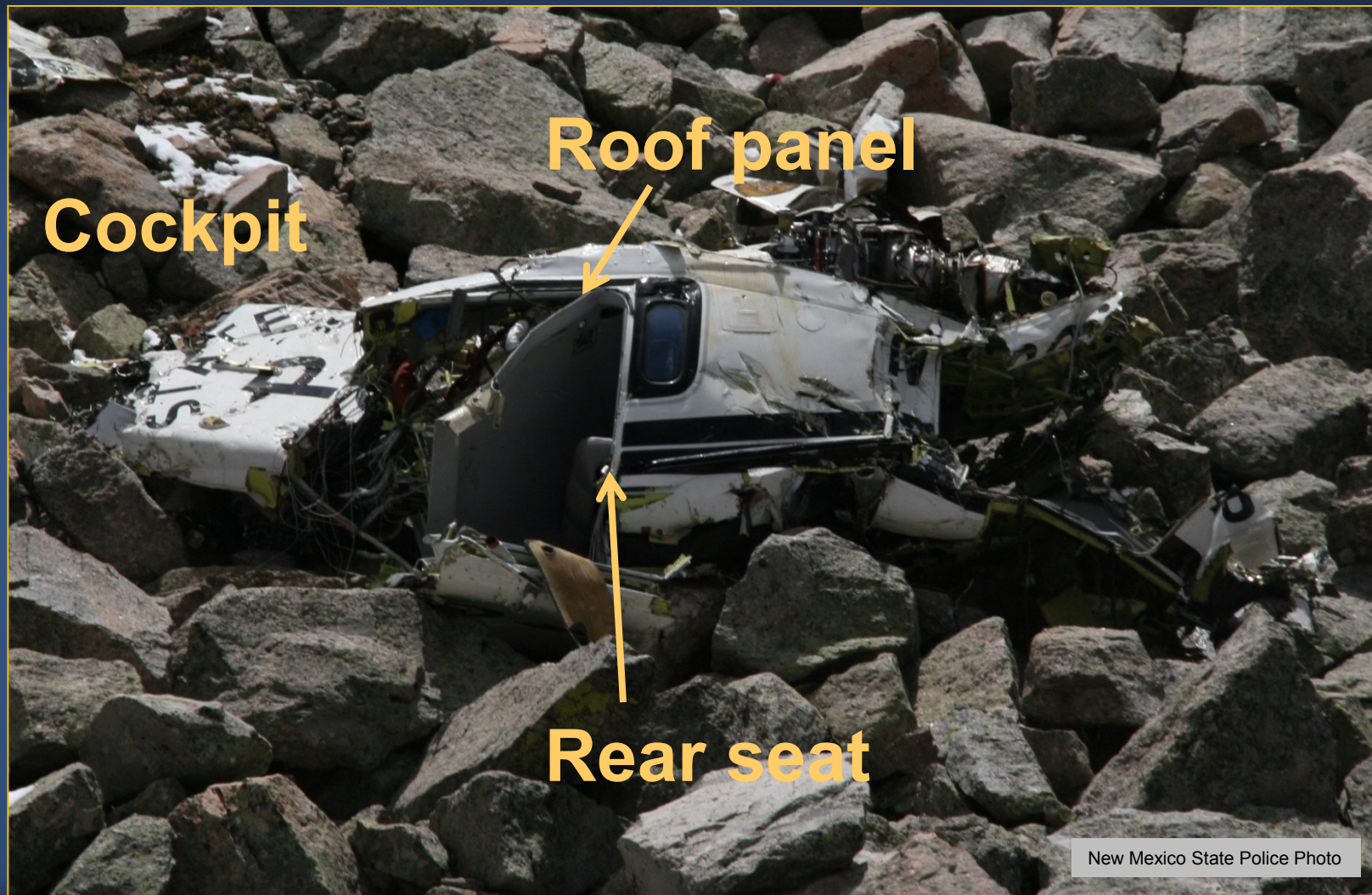
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New Mexico State Police Helicopter Sante Fe, New Mexico (June 9, 2009)



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Fuselage



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New Mexico State Police Helicopter Sante Fe, New Mexico (June 9, 2009)

- Contributing to the accident were . . .
the pilot's fatigue . . .
- Also contributing were . . .
lack of an effective fatigue management
program for pilots . . .



Fatal Aviation Accidents (Examples)

(fatigue cited)

- 8/97 Guam: 228 fatalities
- 6/99 Little Rock AK: 11 fatal
- 10/04 Kirksville MO: 11 fatalities
- 8/06 Lexington KY: 49 fatalities
- 7/08 Owatonna MN: 8 fatalities
- 2/09 Buffalo NY: 49 fatalities
- 6/09 Santa Fe NM: 2 fatalities



NTSB recommendations
to address fatigue.



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NTSB Safety Recommendations: Fatigue

- 40 years ago: May 10, 1972
- “Revise FAR 135 to provide adequate flight and duty time limitations.” (A-72-55)
- Classified “Closed-Unacceptable”





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MOST WANTED LIST

A program to increase the public's awareness of, and support for, action to adopt safety steps that can help prevent accidents and save lives. The following are ten of the current issues.



Addressing Human
Fatigue



General Aviation
Safety



Safety Management
Systems



Runway Safety



Bus Occupant Safety



Pilot & Air Traffic
Controller
Professionalism



Recorders



Teen Driver Safety



Addressing Alcohol-
Impaired Driving



Motorcycle Safety



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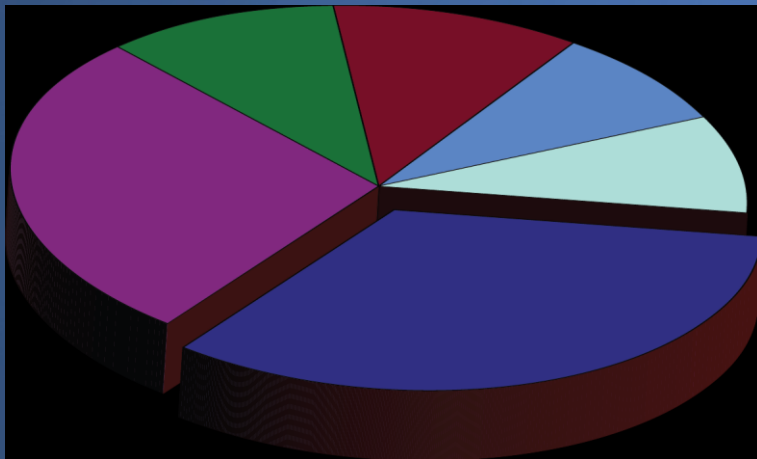
NTSB Safety Recommendations: Fatigue

- MOST WANTED 1990 - 2012
- ~200 fatigue recommendations



Complex Issue:

Requires Multiple Solutions



- Scheduling Policies and Practices
- Education/Awareness
- Organizational Strategies
- Healthy Sleep
- Vehicle and Environmental Strategies
- Research and Evaluation



NTSB Fatigue Recommendations: Education/Strategies

- Develop a fatigue education and countermeasures training program
- Educate operators and schedulers
- Include information on use of strategies: naps, caffeine, etc.
- Review and update materials



Scheduling Policies and Practices

Victoria, Texas, January 2, 2008



Victoria, Texas Fire Department

- Day sleep, night drive, ~ 4 am WOCL



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NTSB Fatigue Recommendations: Hours of Service / Scheduling

- Science-based hours of service
- Allow for at least 8 hours of uninterrupted sleep
- Fatigue mitigation strategies in the hours-of-service regulations for passenger-carrying drivers who operate during the nighttime window of circadian low
- Reduce schedule irregularity and unpredictability



Sleep Apnea

Mexican Hat, UT, January 6, 2008



- 360 rollover, 50/53 ejected, 9 fatalities, OSA (-CPAP)



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NTSB Fatigue Recommendations: Sleep Apnea/Health Related

- Develop standard medical exam to screen for sleep disorders; require its use
- Educate companies and individuals about sleep disorder detection and treatment, and the sedating effects of certain drugs
- Ensure drivers with apnea are effectively treated before granting unrestricted medical certification



Owatonna, MN (July 31, 2008)



8 fatalities



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Owatonna, MN (July 31, 2008): Safety Recommendations

7. Revise regulations and policies to permit appropriate use of prescription sleep medications by pilots under medical supervision for insomnia.
9. Review the policy standards for all common sleep-related conditions, including insomnia, and revise them in accordance with current scientific evidence to establish standards under which pilots can be effectively treated for common sleep disorders while retaining their medical certification.

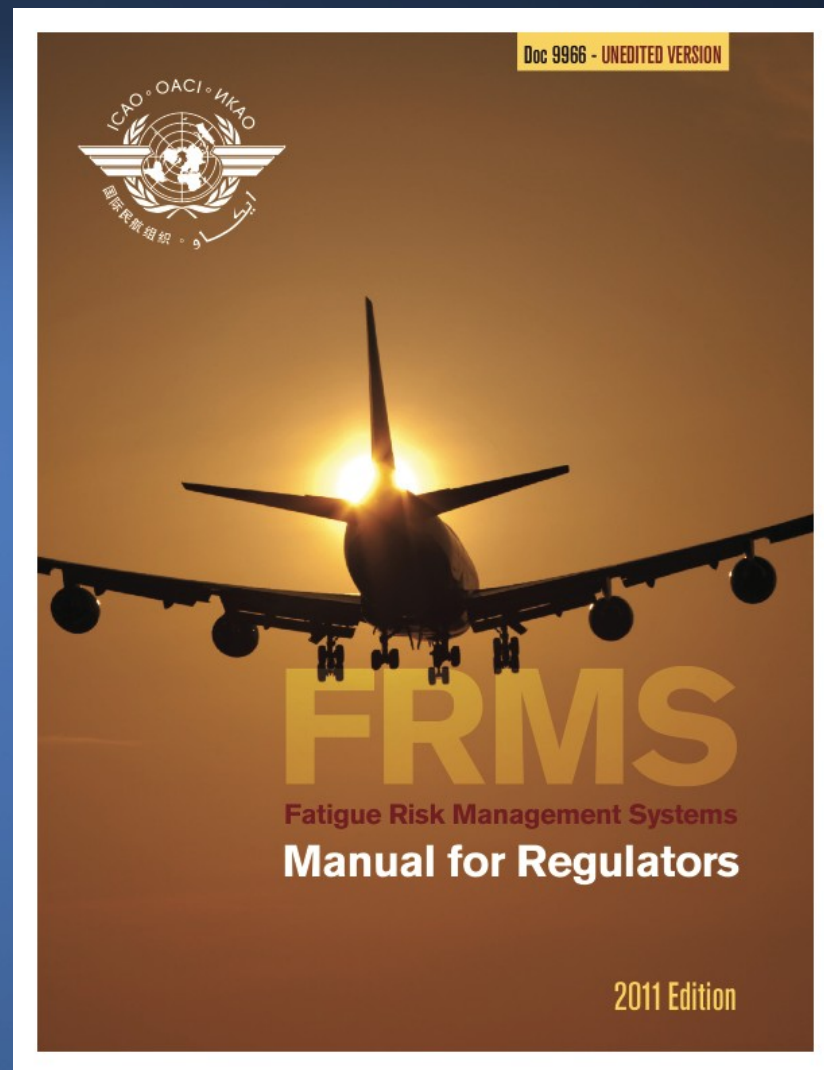
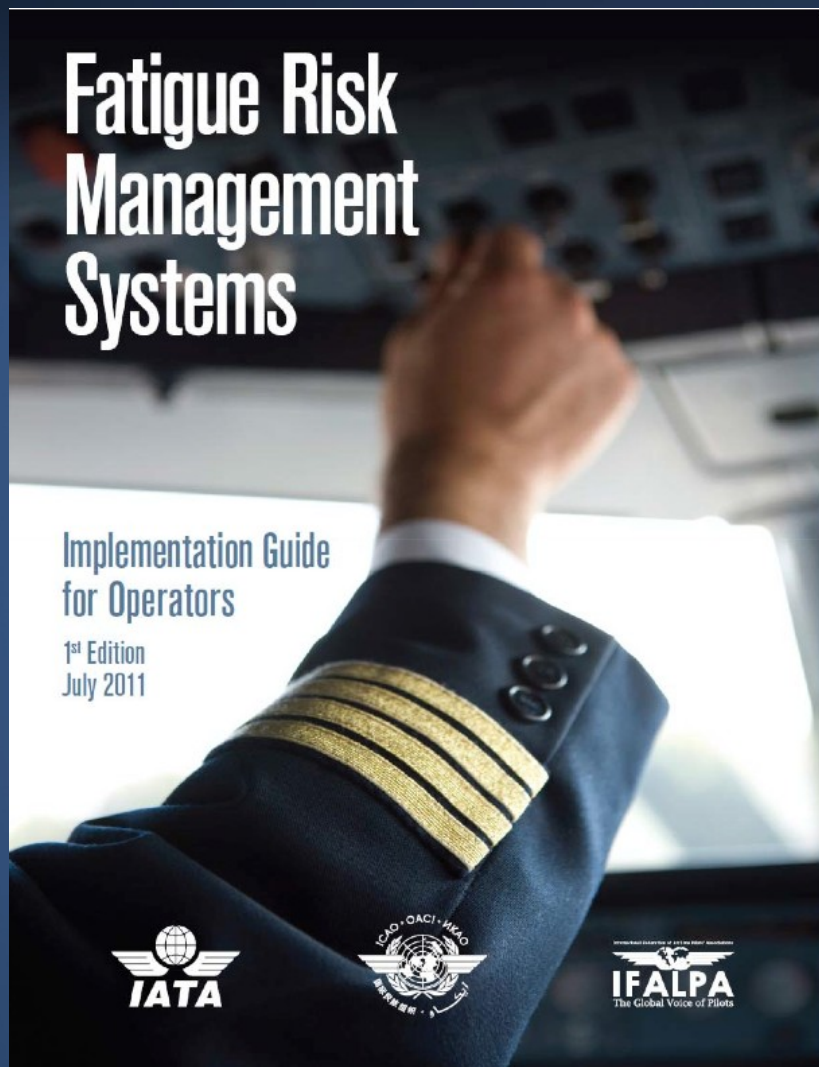


NTSB Fatigue Recommendations: Fatigue Management Systems

- Develop guidance based on empirical and scientific evidence for operators to establish fatigue management systems
- Establish an ongoing program to monitor, evaluate, report on, and continuously improve fatigue management programs implemented by motor carriers to identify, mitigate, and continuously reduce fatigue-related risks for drivers.



Examples



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Manage Sleep = Enhance Safety

- Promote culture change
- Educate everyone
- Acknowledge risks
- Take action!



Good sleep, safe travels.



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